

## THE DESIGN AND EVALUATION OF SOFTWARE THAT USES AUDITORY CUES TO HELP LOW VISION STUDENTS VIEW ELECTRONIC BLACKBOARD NOTES

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Taking notes in a classroom can be a serious problem for students with low vision. These students are not blind, but may need to be within a few inches of an object to properly view it, and many have some form of color-blindness. Interest in assisting students with low-vision sparked the development of v-VIS (Viewer for Visually Impaired Students). When using v-VIS, a pen-based video system is required for the instructor. Such a system consists of a flat adjustable screen (video tablet) and an electronic stylus. The tablet connects to a computer in the same way a regular computer monitor would. The instructor then writes on the tablet as if it were an overhead projector or piece of paper. A projector is installed in the classroom and the notes written on the tablet are projected to a screen at the front of the room. Students without vision problems simply view the projected notes normally. A low vision student, however, would also have a video tablet or laptop for her use in class. v-VIS transmits these notes electronically and displays them on the student video tablet. The student runs a student version of v-VIS which includes features to aid in viewing the notes.

Visually impaired students using v-VIS may control a rectangular “magnifying glass” that magnifies the text they see on their video tablet. The magnifying glass can be expanded and contracted to best fit the student’s needs. The percentage by which notes under the magnifying glass are magnified is also student-controlled. Because many low-vision students also have some form of color-blindness, v-Vis is customizable so the student may choose from a variety of colors for both the background of the screen and the color of the electronic “ink” that appears on the student’s screen when the instructor writes. This tool is known as a color filter because the preferences the student sets affect her screen only and have no bearing on the ink color the teacher chooses.

The v-VIS interface is designed in a non-traditional format. For example, it does not make use of traditional menu structures or sizes. All options available to the student are displayed through a screen-sized toolbar that uses large fonts and icons. Students display and access the toolbar by pressing the spacebar. This method of access allows the toolbar to utilize all available space to ease in viewing. Toolbar options include adjustments to color and magnification.

Even with the magnifying glass, a low vision student would still require some way to know when to watch her screen and when she could be free to copy notes. Students with regular vision simply see the professor move to the board and begin writing, but a low vision student may not even be able to see the front of the room at all. To account for that inequality, the v-VIS system delivers an auditory cue that directs the student to watch the part of her screen where new information is displayed. An ambient sound continues to play as long as new information is arriving in the same part of the screen, informing the student to continue to look there. We conducted a formal user study to determine what sounds would best cue users.

This talk will begin with a description of the v-VIS system. We will then describe the formal user studied that was conducted and will present the results of the study. Finally, our plans for future work will be described.

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